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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: IMMUNOGENIC POLYPEPTIDES ENCODED BY MAGE MINIGENES AND USES THEREOF

(57) Abstract: The invention discloses immunogenic polypeptides comprising several MAGE-specific antigen epitopes selected from different (i.e. discrete) members of the MAGE protein family, nucleic acids coding therefor, recombinant viruses and/or cells comprising said nucleic acids, and compositions thereof. Methods for eliciting or inducing MAGE-specific immune responses utilizing the aforementioned immunogenic agents are also disclosed.

WO 01/085932 A3

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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C12N15/12 C07K14/47 A61K39/00 A61K38/17 C12N15/863
C12N15/861 A61K31/7088 A61K48/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C12N C07K A61K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

BIOSIS, EPO-Internal, WPI Data, SEQUENCE SEARCH, PAJ, CHEM ABS Data, MEDLINE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 00 20445 A (DUFFOUR MARIE THERESE ;STROOBANT VINCENT (BE); SCHULTZ ERWIN (BE);) 13 April 2000 (2000-04-13) page 42 -page 43; example 3 page 67 -page 74; examples 11-13 page 21; table 1 ---	1-40
A	VAN DEN EYNDE B J ET AL: "Tumor antigens recognized by T lymphocytes." INTERNATIONAL JOURNAL OF CLINICAL & LABORATORY RESEARCH, vol. 27, no. 2, 1997, pages 81-86, XP001053689 ISSN: 0940-5437 cited in the application the whole document --- -/--	1-40

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

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PCT/CA 01/00646

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 97 34009 A (WARNIER GUY ;BOON FALLEUR (BE); LURQUIN CHRISTOPHE (BE); UYTENHOV) 18 September 1997 (1997-09-18) claims; examples 2,3 ---	1-40
A	P. CHAUX ET AL: "Identification of five MAGE-A1 epitopes recognized by cytolytic T Lymphocytes obtained by in vitro stimulation with dendritic cells transduced with MAGE-A1" JOURNAL OF IMMUNOLOGY., vol. 163, no. 5, 1 September 1999 (1999-09-01), pages 2928-2936, XP002197553 BALTIMORE US the whole document ---	1-40
A	WO 99 40188 A (SLAOUI MONCEF MOHAMED ;SMITHKLINE BEECHAM BIOLOG (BE); COHEN JOSEP) 12 August 1999 (1999-08-12) claims; examples ---	1-5,9,10
A	HU X ET AL: "ENHANCEMENT OF CYTOLYTIC T LYMPHOCYTE PRECURSOR FREQUENCY IN M MELANOMA PATIENTS FOLLOWING IMMUNIZATION WITH THE MAGE-1 PEPTIDE LOADED ANTIGEN RPRESENTING CELL-BASED VACCINE1" CANCER RESEARCH, AMERICAN ASSOCIATION FOR CANCER RESEARCH; BALTIMORE, MD, US, vol. 56, 1 June 1996 (1996-06-01), pages 2479-2483, XP000605404 ISSN: 0008-5472 the whole document ---	1-40
A	GAUGLER B ET AL: "HUMAN GENE MAGE-3 CODES FOR AN ANTIGEN RECOGNIZED ON A MELANOMA BY AUTOLOGOUS CYTOLYTIC T LYMPHOCYTES" JOURNAL OF EXPERIMENTAL MEDICINE, TOKYO, JP, vol. 179, no. 3, 1 March 1994 (1994-03-01), pages 921-930, XP000576724 ISSN: 0022-1007 cited in the application the whole document especially page 925-928 page 928; figure 7 ---	

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/CA 01/00646

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	J.F. TOSO ET AL: "MAGE-1-specific precursor cytotoxic T-Lymphocytes present among Tumor-nfiltrating lymphocytes from a patient with breast cancer: Characterization and Antigen-Specific Activation" CANCER RESEARCH., vol. 56, 1 January 1996 (1996-01-01), pages 16-20, XP002197554 AMERICAN ASSOCIATION FOR CANCER RESEARCH, BALTIMORE, MD., US ISSN: 0008-5472 the whole document	1-40
A	WO 95 19783 A (CELIS ESTEBAN ;GREY HOWARD M (US); CYTEL CORP (US); KUBO RALPH T () 27 July 1995 (1995-07-27) claims; examples	1-10,35, 37,38

INTERNATIONAL SEARCH REPORT
Information on patent family members

International Application No
PCT/CA 01/00646

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 0020445	A	13-04-2000	AU 5992999 A EP 1117679 A2 WO 0020445 A2	26-04-2000 25-07-2001 13-04-2000
WO 9734009	A	18-09-1997	FR 2746110 A1 AU 732288 B2 AU 2164197 A BR 9707994 A CA 2248612 A1 CN 1218512 A CZ 9802915 A3 EP 0889969 A1 WO 9734009 A1 HU 9902150 A2 JP 2000507229 T NO 984052 A SK 124698 A3	19-09-1997 12-04-2001 01-10-1997 27-07-1999 18-09-1997 02-06-1999 16-12-1998 13-01-1999 18-09-1997 29-11-1999 13-06-2000 03-09-1998 07-05-1999
WO 9940188	A	12-08-1999	AU 737337 B2 AU 2722099 A BR 9907691 A CA 2319309 A1 CN 1295616 T WO 9940188 A2 EP 1053325 A2 HU 0102639 A2 JP 2002502604 T NO 20003958 A PL 342852 A1 TR 200002284 T2 ZA 9900872 A	16-08-2001 23-08-1999 14-11-2000 12-08-1999 16-05-2001 12-08-1999 22-11-2000 28-11-2001 29-01-2002 04-10-2000 16-07-2001 21-11-2000 04-08-2000
WO 9519783	A	27-07-1995	US 5662907 A AU 1834095 A AU 4111999 A CA 2181920 A1 EP 0749315 A1 NZ 281409 A SG 49743 A1 WO 9519783 A1	02-09-1997 08-08-1995 23-09-1999 27-07-1995 27-12-1996 28-01-2000 15-06-1998 27-07-1995